The Arizona Department of Transportation Sustainable Transportation Program

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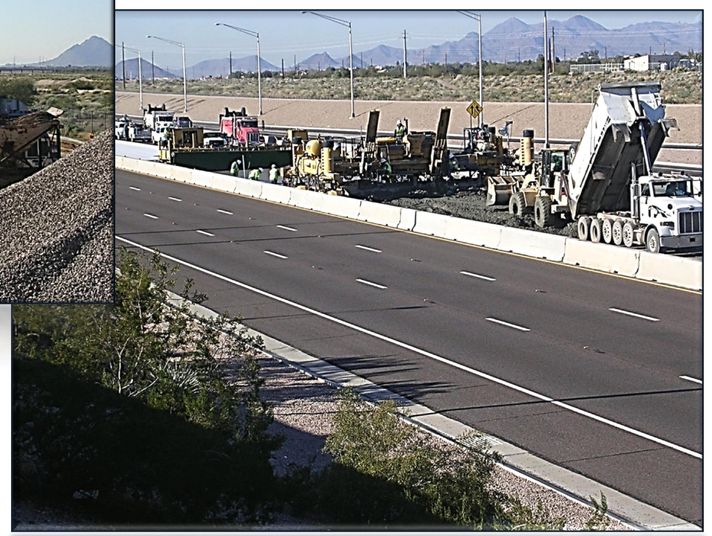
Operationalizing Sustainable Transportation- The ADOT Approach

Abstract

Though many states and local public agencies are encouraging and implementing sustainability plans or efforts, integration of an entire sustainable transportation program inside a state Department of Transportation (DOT) can be a particularly complex undertaking. Traditional planning, design, and construction dynamics, where any given discipline is focused solely on their respective area of expertise, is not always conducive to adopting and/or integrating a collaborative sustainable process. Amongst these challenges, developing a state DOT sustainable transportation program from the ground up, that encompasses an agency wide approach including administration, project planning, design, construction and systems operations and maintenance, is a daunting effort. Establishing a process to operationalize such a far reaching sustainable transportation program that properly reflects these new and novel economic, social, and environmental considerations and maintains executive management buy-in, was experimental at the state DOT level. The Arizona Department of Transportation (ADOT) presented their initial experience with sustainability tools and process identification at the 2015 Transportation Research Board Annual Meeting. Since that time, ADOT has made measurable inroads in understanding the sustainability playing field as it encompasses transportation systems, has begun completing the initial program framework, and introduced subsequent operationalization of these activities.



ADOT in Action (above and to the right) –
During a $100 million HOV widening project, an alternative construction method was utilized. A temporary batch plant was constructed within the project limits in an urban setting to aid in the reduction of energy and fuel emissions, promote the better management of traffic safety and conditions through minimizing opportunity for traffic impediments, and increased material availability and decrease fuel consumption as a result of proximity. Cost savings, social endorsement, and environmental objectives were also accredited through the limitation of traffic control requirements, accelerated construction schedule, and condensed overall footprint.

Next steps and Potential Program Development…

Through the assessment of the agency and its moving parts, to achieve a new set of sustainable objectives, ADOT continually came across the need to address effects which may result from heat extremes, dust storms, wildfires, flooding, landslides, rock fall incidents and slope failures. In order to manage the ever-growing potential cost of these pressures, ADOT set out to develop a pilot resilience program. Since the Agency has had a long history in considering the balance between predictable asset deterioration curves and the unknown, often erratic and abrupt incidents of flood, overtopping, system hotspot identification, hydraulic- related failure, and extreme weather impacts, these topics were identified to make up the core of the pilot program. The ADOT Resilience Pilot Program (RPP) would initially approach the below 3 goals:

1- Centralize the concerns encompassing the unknown, erratic and abrupt incidents of stormwater and its contributors of flooding, overtopping, system hotspots and hydraulic-related failures under one managing entity to hone efforts.

2- Introduce extreme weather adaptation into agency and engineering design processes, as well as, establish current transportation asset sensitivity to extreme weather incidents

3- Identify scientifically informed climate data downscaling as it relates to transportation systems

The realization there was a genuine interest in presenting concrete solutions based on currently available technology, tools and partnerships was key in establishing early success. ADOT recognized the readily available expertise of the regional US Geological Survey (USGS) and proceeded in establishing a formal partnering opportunity. This has, in turn, lead to the progression of next generation ground based Light Detection and Ranging (LiDAR) , drone-based photogrammetry and other data collection platforms used to model characteristics such as magnitude of peak flow, sediment transfer and channel migration to directly influence design and engineering efforts. This on-going partnership has continued to evolve and grow in an effort to promote advancement in the transportation field.

How is sustainable transportation defined at ADOT?

ADOT's Sustainable Transportation Program
Arizona's transportation infrastructure is spread over 114,000 square miles, operates from sea level to 6,000 feet and withstands temperatures that range from below 0 F to over 120 F. Maintaining optimum health and performance of this infrastructure is critical to Arizona's economic vitality, quality of life, and natural and built environments. ADOT recognizes the critical need to plan and prioritize resources more efficiently in order to maintain and operate a robust, economically beneficial transportation network. Through continuous improvement practices, ADOT strives to strategically invest resources to achieve the highest possible return. ADOT also recognizes, in relation to investment and return dynamics, the importance of delivering transportation solutions in a more sustainable manner to achieve economic, social, and environmental goals. ADOT has moved from the early stages of identifying sustainable strategies to operationalizing a sustainable transportation program into core administrative, planning, design, construction, operations and maintenance activities.

ADOT's Sustainability Process Identification
The three primary principles of sustainability revolve around achieving an efficient, well-balanced use of economic, social, and environmental resources commonly known as the triple bottom line. In theory, this will allow for proper use of funding while attaining all potential project needs. A sustainable highway, for example, will not only incorporate the need for mobility and transportation alternatives but also consider safety, accessibility, livability, asset management, and environmental protection.

The window of opportunity to fulfill all that is desired before a project's completion requires extensive coordination not only within a core group of individuals delivering the project but also those who are considered stakeholders during the project development process.

Guidebook for Sustainability Performance Measurement for Transportation Agencies, "Often, a goal will support more than one principle. Yet no one goal in itself is sufficient to achieve sustainability - it takes multiple goals, pursued in concert, to promote sustainability. When a final set of goals is defined, it's important to crosscheck the package of goals to ensure that all of the principles are well addressed. In doing so, take care not to force-fit the goals to make them map to the principles. A balanced goal set, however, achieves comprehensive coverage of the basic principles of sustainability…"

Sustainability Process Identification

The most effective use of resources in this day and age is one in which multiple objectives are achieved, and the methods which lead to those outcomes are documentable and repeatable. In order to develop a step ladder approach to the project delivery process, the meticulous progression of identifying and prioritizing what is a reasonable universe of sustainable considerations within ADOT was a necessary conversation to be had. Through the participation of champions, who initiated the open discussion, and executive management, ADOT developed the Milestones Framework, consisting of 13 (thirteen) milestones, ultimately aiding in the sustainable transportation building process and drove the introduction of sustainability inside a state DOT.

ADOT Sustainable Transportation Program Milestones Framework

The ADOT Sustainable Transportation Working Group (STWG) developed the above framework with the intention of further initiating the concept of the Operational Focus Areas (OFA). This would be comprised of 37 (thirty-seven) currently reasonable entry points to implement into the program. OFA's were selected for one of 3 reasons: 1- there was a true operational need, 2- it aligned with the agency's Strategic Focus Areas (SFA, which is essentially ADOT's agency mission), and 3- it could contribute to both Arizona and the national state of the practice in connection to sustainable transportation.

Operational Focus Areas

Sustainable Transportation Planning
- MPD/MPO/COG sustainability tools training
- I-11 Intermountain West Corridor INVEST use
- ADOT MPD/MPO/COG Guidebook Update
- Complete Transportation Guidebook development
- Sustainable outreach with Arizona Tribes

Sustainable Transportation Project Development
- EASPD Award Program
- Continue INVEST PD scoring
- Sustainable Earthwork Plan
- Sustainable Pavement System Pilot Program
- Upgrade Standard Specifications - waste
- Upgrade Standard Specifications - LED lighting
- Upgrade Standard Specifications - HDPE Pipe
- Project scoping documents
- FHWA Every Day Counts Technology adoption

Sustainable Transportation Operations
- US DOT Office of Operations project partnering
- ADOT incorporation of TSMO activities
- FHWA Arizona Division Office activities
- Upgraded heavy equipment idling policy
- High friction surface treatment use
- TSMO case studies to advance national conversation

Sustainable Transportation Maintenance
- INVEST OM Scoring Project
- District Sustainability Working sub-group
- PeCoS maintenance performance system upgrades
- Millings Reuse Policy development
- Leverage the idling policy
- Leverage equipment services fuel efficiency plan
- Final Report INVEST O&M
- Tie OM to performance measures and TAMP

Sustainable Transportation Agency
- Comprehensive Internal Sustainability Plan
- Provide support for alternative fuel vehicles
- Consolidated energy efficiency and use plan
- Consolidated recycling plan
- Expand university outreach
- Begin sustainable freight subprogram
- Continue to tie link to key commerce corridors
- Maintain national leadership role
- Assist TRB in framing global sustainable transport

Net Benefit of the Process

Beyond the preliminary benefit of solidifying the 13 Milestones and the 37 OFA's, the process lead to a series of direct and indirect outcomes.

Direct	Indirect
ADOT Statewide Project Management training	ADOT State Engineer's Office monthly activity briefing
ADOT Environmental Planning training	Local Public Agency partnering tool
Arizona Local Public Agency outreach training	ADOT INVEST PD case studies
Score 50 (fifty) ADOT construction program projects	State University outreach development
ADOT and Sustainability improved understanding	Wider proliferation (Design, Roadway, District, and other State DOT sharing)
State DOT national leadership opportunity	ADOT/USGS partnership development on stormwater issues
ADOT INVEST grant for Project Development June 2015	ADOT Excellence Award Program
ADOT MPD INVEST System Planning reintroduction	ADOT Best Management Practice identification and advancement
ADOT INVEST grant for Operations and Maintenance	TRB 1st international sustainability conference
	Climate, extreme weather and resilience pilot program opportunity

Concluding Thoughts …

The concept of constructability for highway projects is as old as the engineering, design, and construction process. Over the years many organizations, including ADOT, practiced elements of a constructability program, but did not formalize the process with a name. For almost 100-years ADOT and its predecessor, the Arizona Highway Department, submitted plans for review, conducted field reviews and received construction feedback. What ADOT has attempted to do is evolve this time tested process by encouraging people from diverse cultural backgrounds, with potentially different goals and technical expertise, to work together effectively in an ever-increasingly complex world perplexed by limited resources and funding availability. ADOT's Sustainable Transportation Program, now entering its third year of implementation, is evolving into a reflective extension of the above mentioned constructability evolution.

Acknowledgments

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